

**CLAIMS**

1. A vacuum packaging machine for performing a vacuum sealing operation on a product package, including or in combination with a conveyor; the conveyor arranged to deliver the product package from an upstream station to a position adjacent a vacuum chamber and having a longitudinal direction defined by the direction of travel of the product package on the conveyor; the vacuum chamber arranged to receive the product package containing two or more products and perform a vacuum, sealing and cutting operation on the product package, the vacuum chamber including a heat sealing and cutting assembly therein which is oriented transversely to the longitudinal direction of the conveyor and which is located in a position in the vacuum chamber such that there is sufficient spacing between end walls of the vacuum chamber and the heat sealing and cutting assembly for the product package containing two or more products to be loaded into the vacuum chamber with at least one product located in front of the heat sealing and cutting assembly and at least one other product located behind the heat sealing and cutting assembly, the heat sealing and cutting assembly arranged to seal and cut across the product package between two products to form two separate evacuated packages.
2. A vacuum packaging machine as claimed in claim 1, wherein the heat sealing and cutting assembly includes a pair of heat seal bars.
3. A vacuum packaging machine as claimed in claim 2, wherein the heat sealing and cutting assembly includes a pair of heat seal anvils.
4. A vacuum packaging machine as claimed in claim 2 or 3, wherein the heat sealing and cutting assembly includes a cutting device which is operable to cut the product package between the two heat seals after sealing, to thereby form two separate evacuated packages.
5. A vacuum packaging machine as claimed in claim 4, wherein the cutting device comprises a serrated blade.

6. A vacuum packaging machine as claimed in claim 5, wherein the serrated blade is operable to initially puncture at least one aperture in the product package, so that as each vacuum sealing operation occurs, air is forced out of the package through the punctured aperture(s) prior to heat sealing.
7. A vacuum packaging machine as claimed in any one of claims 2 to 6, wherein the heat sealing and cutting assembly is configured to form two heat seal lines between the two products and then cut between the two heat seal lines to form two separate evacuated packages, following evacuation of the product package.
8. A vacuum packaging machine as claimed in any one of the preceding claims, including an arrangement to clamp the portion of the package to be sealed, prior to sealing and cutting the package.
9. A vacuum packaging machine as claimed in claim 8, wherein the arrangement to clamp comprises a spreading system arranged to spread the portion of the package to be sealed.
10. A vacuum packaging machine as claimed in claim 8, wherein the arrangement to clamp comprises one or more biased pushers which push against the portion of the package to be sealed.
11. A vacuum packaging machine as claimed in any one of the preceding claims, including a puncturing device which is operable to puncture at least one aperture in the portion of the product package adjacent the sealing and cutting assembly so that as the vacuum and sealing operation occurs, air is evacuated from the package through the punctured aperture(s) prior to heat sealing.
12. A vacuum packaging machine as claimed in claim 11, wherein the puncturing device comprises one or more piercing knives.

13. A vacuum packaging machine as claimed in any one of the preceding claims, configured to receive, seal and separate a package having at least one open end and containing at least two products into individual product packages, and including at least one further heat sealing assembly spaced from the heat sealing and cutting assembly and configured to seal the open end(s) of the package after evacuation while the heat sealing and cutting assembly carries out the sealing and cutting operation across the product package between two products to form two product packages.

14. A vacuum packaging machine as claimed in any one of the preceding claims, wherein the conveyor is configured to deliver the product package directly into the vacuum chamber in the longitudinal direction.

15. A vacuum packaging machine as claimed in claim 14, wherein the conveyor has a telescoping portion which is operable to telescope into the vacuum chamber to load the product package into the vacuum chamber and to then retract out of the chamber so that the chamber may be closed to perform the vacuum sealing operation.

16. A vacuum packaging machine as claimed in any one of the preceding claims, including one or more chamber conveyors for receiving the product package into the vacuum chamber and/or conveying the product package from the vacuum chamber following the vacuum sealing operation.

17. A vacuum packaging machine as claimed in claim 16, including two chamber conveyors in the vacuum chamber, wherein one of the chamber conveyors is movable from a position spaced from the heat sealing and cutting assembly to a position in which part of the chamber conveyor extends over a lower part of the heat sealing and cutting assembly.

18. A vacuum packaging machine as claimed in any one of claims 1 to 13, wherein the conveyor is arranged to deliver the product package to a position alongside the vacuum chamber, and including an arrangement to load the product package from the conveyor into the vacuum chamber in a transverse direction.

19. A vacuum packaging machine as claimed in claim 18, wherein the arrangement to load includes at least one further conveyor configured to load the product package from the conveyor into the vacuum chamber in a transverse direction.

20. A vacuum packaging machine as claimed in claim 19, wherein the arrangement to load includes two transverse conveyors in the vacuum chamber to load the product package from the conveyor into the vacuum chamber.

21. A vacuum packaging machine as claimed in any one of the preceding claims, which is indexed to align the portion of the product package between the two products with the heat sealing and cutting assembly.

22. A vacuum packaging machine as claimed in claim 21, wherein the indexing is adjustable to accommodate product packages containing products of different sizes.

23. A vacuum packaging machine as claimed in claim 22, configured to adjust the operation of one or more conveyors to align the portions of packages containing products of different lengths with the heat sealing and cutting assembly.

24. A vacuum packaging machine as claimed in any one of claims 21 to 23, including a sensor to sense the trailing edge of a leading product and/or a leading edge of a trailing product in the product package on a conveyor.

25. A vacuum packaging machine as claimed in any one of the preceding claims, including a further heat sealing and cutting assembly spaced from the heat sealing and cutting assembly, the heat sealing and cutting assemblies configured to heat seal and cut between at least three products in a product package to form three separate evacuated packages.

26. A vacuum packaging machine as claimed in any one of claims 1 to 25, configured to load a single product package containing two or more products into the vacuum chamber at a time for the vacuum sealing operation.

27. A vacuum packaging machine as claimed in any one of claims 1 to 25, configured to concurrently load more than one package into the vacuum chamber at a time, the packages being arranged transversely in the vacuum chamber so that they can be vacuum sealed concurrently.

28. A vacuum packaging machine as claimed in any one of claims 1 to 27, further including or provided in combination with at least one outfeed conveyor operable to convey evacuated product packages from the vacuum packaging machine.

29. A vacuum packaging machine as claimed in claim 28, wherein the vacuum packaging machine is configured to load and unload product packages concurrently.

30. A vacuum packaging machine as claimed in any one of claims 1 to 29, wherein the vacuum packaging machine has a single vacuum chamber.

31. A vacuum packaging machine as claimed in any one of claims 1 to 29, wherein the vacuum packaging machine has multiple vacuum chambers.

32. A vacuum packaging machine as claimed in any one of the preceding claims, provided in combination with a wrapping or bagging machine arranged to load at least two products into each product package to be sealed in the vacuum packaging machine.

33. The combination as claimed in claim 32, wherein the wrapping or bagging machine is configured to make or cut each package to a size approximating the size of the products in the package.

34. The combination as claimed in claim 32 or 33, wherein the wrapping or bagging machine is configured to position the products in each product package with a predetermined spacing.

35. The combination as claimed in any one of claims 32 to 34, wherein the wrapping or bagging machine is programmable to vary the product package size or predetermined spacing.

36. The combination as claimed in any one of claims 32 to 35, wherein the wrapping or bagging machine is configured to capture air in the product package when sealing the product package.

37. A method of vacuum sealing a product package, including:  
providing a vacuum packaging machine including or in combination with a conveyor configured to deliver product packages from an upstream station to a position adjacent a vacuum chamber and having a longitudinal direction defined by the direction of travel of the product packages on the conveyor; the vacuum chamber including at least one heat sealing and cutting assembly which is oriented transversely to the longitudinal direction of the conveyor;  
bringing the product package containing at least two products to a position adjacent the vacuum chamber on the conveyor, the product package oriented with products one behind the other on the conveyor;  
loading the product package into the vacuum chamber such that one product is located in front of the sealing and cutting assembly and another product is located behind the sealing and cutting assembly, with the portion of the package between the products located over the sealing and cutting assembly or part of the sealing and cutting assembly; and  
vacuum sealing and cutting the portion of the product package between the two products to form two separate evacuated packages.

38. A method of vacuum sealing a product package as claimed in claim 37, including clamping the portion of the product package between the two products prior to the vacuum sealing and cutting operation.

39. A method of vacuum sealing a product package as claimed in claim 37 or 38, including puncturing at least one aperture in the product package prior to the vacuum sealing and cutting operation, to enable air to be evacuated from the product package.

40. A method of vacuum sealing a product package as claimed in claim 39, wherein the vacuum sealing and cutting operation includes forming two spaced apart heat seals, and cutting between the two heat seals to form the separate evacuated product packages.

41. A method of vacuum sealing a product package as claimed in any one of claims 37 to 40, wherein the products are in a package having at least one open end, wherein the vacuum chamber includes at least one further heat sealing assembly spaced from the heat sealing and cutting assembly and configured to seal the open end(s) of the package after evacuation while the heat sealing and cutting assembly carries out the vacuum sealing and cutting operation across the portion of the package between the two products to form the separate evacuated product packages.

42. A method of vacuum sealing a product package as claimed in any one of claims 37 to 41, including delivering the product package directly into the vacuum chamber on the conveyor.

43. A method of vacuum sealing a product package as claimed in claim 42, wherein the conveyor has a telescoping portion which is operable to telescope into the vacuum chamber to load each product package into the vacuum chamber and to then retract out of the chamber so that the chamber may be closed to perform the vacuum sealing operation.

44. A method of vacuum sealing a product package as claimed in any one of claims 37 to 43, wherein the vacuum packaging machine includes one or more chamber conveyors for receiving the product package into the vacuum chamber and/or conveying

the product packages from the vacuum chamber following the vacuum sealing and cutting operation.

45. A method of vacuum sealing a product package as claimed in claim 44, wherein the vacuum packaging machine includes two chamber conveyors in the vacuum chamber, wherein one of the chamber conveyors is movable from a position spaced from the heat sealing and cutting assembly to a position in which part of the chamber conveyor extends over a lower part of the heat sealing and cutting assembly.

46. A method of vacuum sealing a product package as claimed in any one of claims 37 to 41, wherein the conveyor is arranged to deliver the product package to a position alongside the vacuum chamber, and the method includes loading the product package from the conveyor into the vacuum chamber in a transverse direction.

47. A method of vacuum sealing a product package as claimed in claim 46, further including unloading the separate evacuated product packages from the vacuum chamber in a transverse direction.

48. A method of vacuum sealing as claimed in any one of claims 37 to 47, including determining the position of the portion of the product package to be sealed and aligning the portion of the product package to be sealed with the heat sealing and cutting assembly.

49. A method of vacuum sealing as claimed in claim 48, including detecting the trailing edge of a leading product and/or the leading edge of a trailing product in the product package, and calculating from the speed of a conveyor carrying the product when the conveyor should be stopped to align the portion to be sealed with the heat sealing and cutting assembly.

50. A method of vacuum sealing as claimed in claim 48 or 49, including adjusting the operation of a conveyor to account for products of different sizes.

51. A method of vacuum sealing as claimed in any one of claims 37 to 49, wherein the vacuum chamber includes a further heat sealing and cutting assembly spaced from the heat sealing and cutting assembly, and the method includes heat sealing and cutting between at least three products in a product package to form three separate evacuated packages.

52. A method of vacuum sealing as claimed in any one of claims 37 to 51, wherein the loading operation comprises loading a single product package containing two or more products into the vacuum chamber at a time for the vacuum sealing operation.

53. A method of vacuum sealing as claimed in any one of claims 37 to 51, wherein the loading operation comprises concurrently loading more than one package into the vacuum chamber at a time such that the packages are arranged transversely in the vacuum chamber so that they can be vacuum sealed concurrently.

54. A method of vacuum sealing as claimed in any one of claims 37 to 53, including conveying evacuated product packages from the vacuum chamber on at least one outfeed conveyor.

55. A method as claimed in claim 54, wherein product package(s) is/are loaded into the vacuum chamber concurrently with the unloading of the evacuated product packages.

56. A method as claimed in any one of claims 37 to 55, wherein the vacuum packaging machine has a single vacuum chamber.

57. A method as claimed in any one of claims 37 to 55, wherein the vacuum packaging machine has multiple vacuum chambers.

58. A method of vacuum sealing as claimed in any one of claims 37 to 57, wherein the vacuum packaging machine is provided in combination with a wrapping or bagging machine, and the method includes loading at least two products into a product package to be sealed in the vacuum packaging machine.

59. A method of vacuum sealing as claimed in claim 58, including cutting or making the package in the wrapping or bagging machine to a size approximating the size of the products.

60. A method of vacuum sealing as claimed in claim 58 or 59, including positioning the products in the product package with a predetermined spacing.

61. A method of vacuum sealing as claimed in any one of claims 58 to 60, including capturing air in the product package when sealing the product package in the wrapping or bagging machine.